

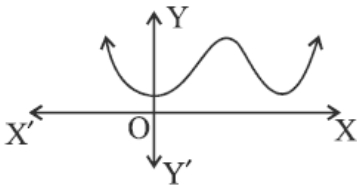
Marking Scheme
Strictly Confidential
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Secondary School Examination, 2026
MATHEMATICS (STANDARD) (041) (PAPER CODE 30/1/2)

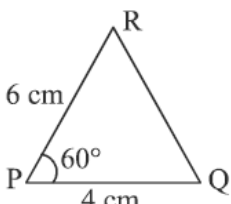
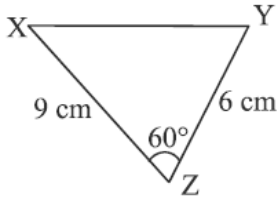
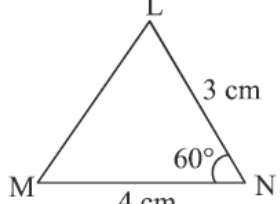
General Instructions: -

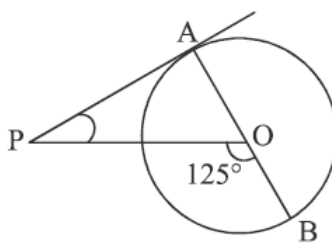
1.	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the Spot Evaluation Guidelines carefully.
2.	“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. It’s leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc. may invite action under various rules of the Board and BNS.”
3.	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one’s own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In Class-X, while evaluating the Competency-based questions, please try to understand given answer and even if reply is not from Marking Scheme but correct competency is enumerated by the candidate, due marks should be awarded.
4.	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5.	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6.	Evaluators will mark (✓) wherever answer is correct. For wrong answer CROSS ‘X’ be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.
7.	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totalled up and written on the left-hand margin and encircled. This may be followed strictly.
8.	If a question does not have any parts, marks must be awarded on the left-hand margin and encircled. This may also be followed strictly.

9.	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note “Extra Question” .
10.	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11.	A full scale of marks 0 to 80 (example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
12.	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.
13.	<p>Ensure that you do not make the following common types of errors committed by the Examiner in the past:-</p> <ul style="list-style-type: none"> ● Leaving answer or part thereof unassessed in an answer book. ● Giving more marks for an answer than assigned to it. ● Wrong totalling of marks awarded to an answer. ● Wrong transfer of marks from the inside pages of the answer book to the title page. ● Wrong question wise totalling on the title page. ● Wrong totalling of marks of the two columns on the title page. ● Wrong grand total. ● Marks in words and figures not tallying/not same. ● Wrong transfer of marks from the answer book to Online Award List. ● Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.) ● Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
14.	While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.
15.	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16.	The Examiners should acquaint themselves with the guidelines given in the “Guidelines for spot Evaluation” before starting the actual evaluation.
17.	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.
18.	The candidates are entitled to obtain Photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

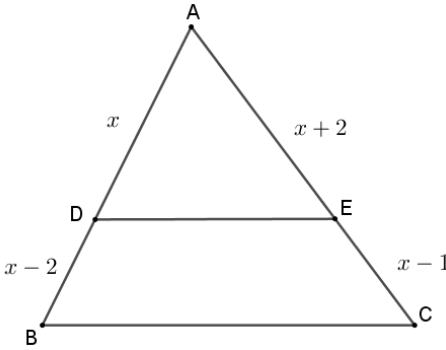
MARKING SCHEME
MATHEMATICS (Subject Code-041)
(PAPER CODE: 30/1/2)

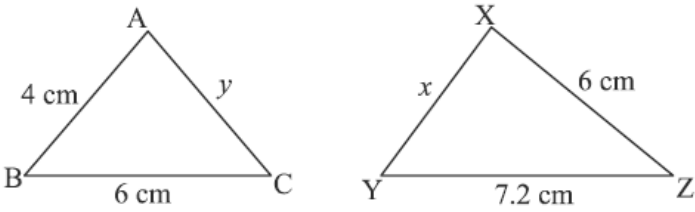
Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Step	Marks
	<p style="text-align: center;">SECTION – A</p> <p>Question Numbers 1 to 20 are multiple choice questions of 1 mark each.</p>		
1.	The natural number 2 is : (a) a prime number (b) a composite number (c) prime as well as composite (d) neither prime nor composite		
Sol.	(a) a prime number		1
2.	For any natural number n , 6^n ends with the digit : (a) 0 (b) 6 (c) 3 (d) 2		
Sol.	(b) 6		1
3.	The HCF of 960 and 432 is : (a) 48 (b) 54 (c) 72 (d) 36		
Sol.	(a) 48		1
4.	For an event E, $P(E) + P(\bar{E}) = x$, then the value of $x^2 - 3$ is : (a) -2 (b) 2 (c) 1 (d) -1		
Sol.	(a) -2		1
5.	<p>The graph of $y = f(x)$ is given. The number of zeroes of $f(x)$ is :</p> <p>(a) 0 (b) 1 (c) 2 (d) 4</p> <div></div>		
Sol.	(a) 0		1

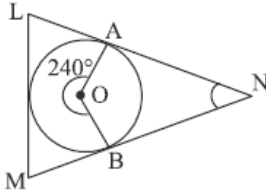
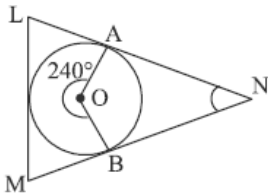
6.	<p>If a pair of linear equations in two variables is represented by two coincident lines, then the pair of equations has :</p> <p>(a) a unique solution (b) two solutions</p> <p>(c) no solution (d) an infinite number of solutions</p>		
Sol.	(d) an infinite number of solutions		1
7.	<p>The first term of an AP is p and the common difference is q, then its 10th term is :</p> <p>(a) $q - 9p$ (b) $p - 9q$ (c) $p + 9q$ (d) $2p + 9q$</p>		
Sol.	(c) $p + 9q$		1
8.	<p>Shown below are three triangles. The measures of two adjacent sides and included angle are given for each triangle :</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Triangle RPQ: $RP = 6\text{ cm}$, $PQ = 4\text{ cm}$, $\angle RPQ = 60^\circ$</p> </div> <div style="text-align: center;">  <p>Triangle XZY: $XZ = 9\text{ cm}$, $ZY = 6\text{ cm}$, $\angle XZY = 60^\circ$</p> </div> <div style="text-align: center;">  <p>Triangle MNL: $LM = 3\text{ cm}$, $MN = 4\text{ cm}$, $\angle MNL = 60^\circ$</p> </div> </div> <p>Which of these triangles are similar ?</p> <p>(a) $\triangle RPQ$ and $\triangle XZY$</p> <p>(b) $\triangle RPQ$ and $\triangle MNL$</p> <p>(c) $\triangle XZY$ and $\triangle MNL$</p> <p>(d) $\triangle RPQ$, $\triangle XZY$ and $\triangle MNL$ are similar to one another</p>		
Sol.	(a) $\triangle RPQ$ and $\triangle XZY$		1
9.	<p>The mid-point of the line segment joining the points $(5, -4)$ and $(6, 4)$ lies on :</p> <p>(a) x-axis (b) y-axis</p> <p>(c) origin (d) neither x-axis nor y-axis</p>		
Sol.	(a) x -axis		1

10.	If $\cos y = 0$, then what is the value of $\frac{1}{2} \cos \frac{y}{2}$? (a) 0 (b) $\frac{1}{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{1}{2\sqrt{2}}$		
Sol.	(d) $\frac{1}{2\sqrt{2}}$		1
11.	If $\cos A = \frac{1}{2}$, then the value of $\sin^2 A + 2 \cos^2 A$ is : (a) $\frac{3}{2}$ (b) $\frac{5}{4}$ (c) -1 (d) $\frac{1}{2}$		
Sol.	(b) $\frac{5}{4}$		1
12.	A car is moving away from the base of a 30 m high tower. The angle of elevation of the top of the tower from the car at an instant, when the car is $10\sqrt{3}$ m away from the base of the tower, is : (a) 30° (b) 45° (c) 90° (d) 60°		
Sol.	(d) 60°		1
13.	If TP and TQ are two tangents to a circle with centre O from an external point T so that $\angle POQ = 120^\circ$, then $\angle PTQ$ is equal to : (a) 60° (b) 70° (c) 80° (d) 90°		
Sol.	(a) 60°		1
14.	In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle POB = 125^\circ$, then $\angle APO$ is equal to : (a) 25° (b) 65° (c) 90° (d) 35°		
Sol.	(d) 35°		1

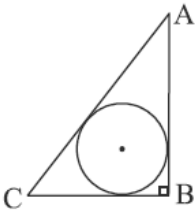
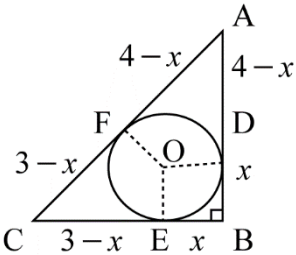
15.	The length of the arc of the sector of a circle with radius 21 cm and of central angle 60° , is : (a) 22 cm (b) 44 cm (c) 88 cm (d) 11 cm		
Sol.	(a) 22 cm		1
16.	The hour hand of a clock is 7 cm long. The angle swept by it between 7:00 a.m. and 8:10 a.m. is : (a) $\left(\frac{35}{4}\right)^\circ$ (b) $\left(\frac{35}{2}\right)^\circ$ (c) 35° (d) 70°		
Sol.	(c) 35°		1
17.	The total surface area of a solid hemisphere of diameter ' $2d$ ' is : (a) $3\pi d^2$ (b) $2\pi d^2$ (c) $\frac{1}{2}\pi d^2$ (d) $\frac{3}{4}\pi d^2$		
Sol.	(a) $3\pi d^2$		1
18.	If the mean and mode of a data are 12 and 21 respectively, then its median is : (a) 6 (b) 13.5 (c) 15 (d) 14		
Sol.	(c) 15		1
<p>Directions : Question numbers 19 and 20 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :</p> <p>(a) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). (b) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A). (c) Assertion (A) is true, but Reason (R) is false. (d) Assertion (A) is false, but Reason (R) is true.</p>			

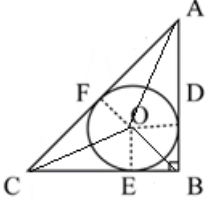

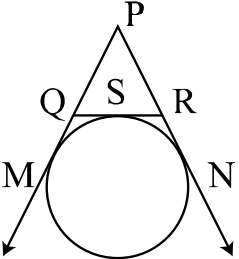
19.	<p>Assertion (A) : The probability that a leap year has 53 Mondays is $\frac{2}{7}$.</p> <p>Reason (R) : The probability that a non-leap year has 53 Mondays is $\frac{5}{7}$.</p>		
Sol.	(c) Assertion (A) is true, but Reason (R) is false.		1
20.	<p>Assertion (A) : The polynomial $p(y) = y^2 + 4y + 3$ has two zeroes.</p> <p>Reason (R) : A quadratic polynomial can have at most two zeroes.</p>		
Sol.	(b) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).		1
	<p style="text-align: center;">SECTION – B</p> <p style="text-align: center;">Question Numbers 21 to 25 are Very Short Answer (VSA) type questions, carrying 2 marks each.</p>		
21 (A).	In ΔABC , $DE \parallel BC$. If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, then find the value of x .		
Sol.	 <p>Since $DE \parallel BC \Rightarrow \frac{AD}{DB} = \frac{AE}{EC}$</p> $\Rightarrow \frac{x}{x-2} = \frac{x+2}{x-1}$ <p>Solving, we get $x = 4$</p>	<p>I</p> <p>II</p> <p>III</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>
	OR		

21 (B).	 <p>In the figure given above, $\Delta ABC \sim \Delta XYZ$, then find the values of x and y.</p>		
Sol.	$\Delta ABC \sim \Delta XYZ \Rightarrow \frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ}$ $\Rightarrow \frac{4}{x} = \frac{6}{7.2} = \frac{y}{6}$ <p>Solving, we get $x = 4.8 \text{ cm}, y = 5 \text{ cm}$</p>	<p>I</p> <p>II</p>	<p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>
22.	<p>The coordinates of the centre of a circle are $(x - 7, 2x)$. Find the value(s) of 'x', if the circle passes through the point $(-9, 11)$ and has radius $5\sqrt{2}$ units.</p>		
Sol.	$\sqrt{(x - 7 + 9)^2 + (2x - 11)^2} = 5\sqrt{2}$ $\Rightarrow (x + 2)^2 + (2x - 11)^2 = 50$ $\Rightarrow 5x^2 - 40x + 75 = 0 \text{ or } x^2 - 8x + 15 = 0$ $\Rightarrow (x - 5)(x - 3) = 0$ $\therefore x = 3, 5$	<p>I</p> <p>II</p> <p>III</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>
23 (A).	<p>If $\tan \theta = \frac{24}{7}$, then find the value of $\sin \theta + \cos \theta$.</p>		
Sol.	$\tan \theta = \frac{24}{7} = \frac{P}{B}$ <p>Getting $\sin \theta = \frac{24}{25}$ and $\cos \theta = \frac{7}{25}$</p> $\therefore \sin \theta + \cos \theta = \frac{24}{25} + \frac{7}{25} = \frac{31}{25}$	<p>I</p> <p>II</p>	<p>1½</p> <p>$\frac{1}{2}$</p>
	OR		

23 (B).	If $\cot \theta = \frac{7}{8}$, then find the value of $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$.		
Sol.	$\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} = \frac{1 - \sin^2 \theta}{1 - \cos^2 \theta}$ $= \frac{\cos^2 \theta}{\sin^2 \theta} = \cot^2 \theta$ $= \left(\frac{7}{8}\right)^2 = \frac{49}{64}$	I II III	1 $\frac{1}{2}$ $\frac{1}{2}$
24.	<p>In the given figure, a circle with centre O is inscribed inside $\triangle LMN$. A and B are the points of tangency. Find $\angle ANB$.</p> 		
Sol.	 <p> $\angle AOB = 360^\circ - \text{reflex } (\angle AOB)$ $\angle AOB = 360^\circ - 240^\circ = 120^\circ$ $\angle ANB = 360^\circ - (90^\circ + 90^\circ + 120^\circ) = 60^\circ$ </p>	I II	1 1
25.	Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and its coefficients.		
Sol.	$x^2 + 7x + 10 = (x + 2)(x + 5)$ <p>So, the zeroes of the polynomial are -2 and -5</p> <p>Sum of zeroes $= -7 = \frac{-7}{1} = -\frac{\text{coefficient of } x}{\text{coefficient of } x^2}$</p> <p>Product of zeroes $= 10 = \frac{10}{1} = \frac{\text{constant term}}{\text{coefficient of } x^2}$</p>	I II III	1 $\frac{1}{2}$ $\frac{1}{2}$

	<p style="text-align: center;">SECTION – C</p> <p style="text-align: center;">Question numbers 26 to 31 are Short Answer (SA) type questions, carrying 3 marks each.</p>		
26.	Prove that $\sqrt{2}$ is an irrational number.		
Sol.	<p>Let $\sqrt{2}$ be a rational number.</p> <p>$\therefore \sqrt{2} = \frac{p}{q}$, where $q \neq 0$ and p & q are coprime.</p> <p>$2q^2 = p^2 \Rightarrow p^2$ is divisible by 2 $\Rightarrow p$ is divisible by 2 ----- (i)</p> <p>Let $p = 2a$, where 'a' is some integer</p> <p>$4a^2 = 2q^2 \Rightarrow q^2 = 2a^2 \Rightarrow q^2$ is divisible by 2 $\Rightarrow q$ is divisible by 2 ----- (ii)</p> <p>(i) and (ii) leads to a contradiction as 'p' and 'q' are coprime.</p> <p>$\therefore \sqrt{2}$ is an irrational number.</p>	<p style="text-align: center;">I</p> <p style="text-align: center;">II</p> <p style="text-align: center;">III</p> <p style="text-align: center;">IV</p>	<p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">$\frac{1}{2}$</p>
27 (A).	<p>If $x = h + a \cos \theta$, $y = k + b \sin \theta$, then prove that :</p> $\left(\frac{x-h}{a}\right)^2 + \left(\frac{y-k}{b}\right)^2 = 1$		
Sol.	<p>$x = h + a \cos \theta \Rightarrow \frac{x-h}{a} = \cos \theta$</p> <p>$y = k + b \sin \theta \Rightarrow \frac{y-k}{b} = \sin \theta$</p> <p>$\therefore \text{LHS} = \left(\frac{x-h}{a}\right)^2 + \left(\frac{y-k}{b}\right)^2 = \cos^2 \theta + \sin^2 \theta = 1 = \text{RHS}$</p>	<p style="text-align: center;">I</p> <p style="text-align: center;">II</p> <p style="text-align: center;">III</p>	<p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>
	OR		

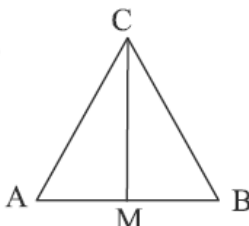
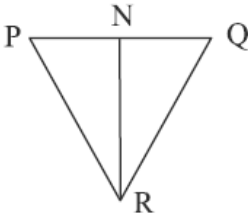
27 (B).	Prove that : $\frac{\tan A}{1+\sec A} - \frac{\tan A}{1-\sec A} = 2 \operatorname{cosec} A$		
Sol.	$\begin{aligned} \text{LHS} &= \frac{\tan A}{1+\sec A} - \frac{\tan A}{1-\sec A} = \frac{\frac{\sin A}{\cos A}}{1+\frac{1}{\cos A}} - \frac{\frac{\sin A}{\cos A}}{1-\frac{1}{\cos A}} \\ &= \frac{\sin A}{\cos A+1} - \frac{\sin A}{\cos A-1} \\ &= \sin A \left(\frac{-2}{-\sin^2 A} \right) \\ &= \frac{2}{\sin A} = 2 \operatorname{cosec} A = \text{RHS} \end{aligned}$	<p>I</p> <p>II</p> <p>III</p> <p>IV</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p>
28 (A).	<p>In the given figure, ΔABC is a right triangle in which $\angle B = 90^\circ$, $AB = 4$ cm and $BC = 3$ cm. Find the radius of the circle inscribed in the triangle ABC.</p> 		
Sol.	 <p>$AC = \sqrt{3^2 + 4^2} = 5$ cm</p> <p>Let $BE = BD = x$ cm</p> <p>$AD = 4 - x = AF$, $CE = 3 - x = CF$</p> <p>$AF + CF = AC \Rightarrow 4 - x + 3 - x = 5$</p> <p>$\therefore x = 1$</p> <p>$BD = BE = 1$ and $\angle B = 90^\circ$</p> <p>Hence radius of circle $= x = 1$ cm</p> <p>ALTERNATE SOLUTION:</p>	<p>I</p> <p>II</p> <p>III</p> <p>IV</p> <p>V</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p>

	 <p> $AC = \sqrt{3^2 + 4^2} = 5 \text{ cm}$ Let r be the radius of the circle $\text{ar}(\triangle ABC) = \frac{1}{2} \times 4 \times 3 = 6 \text{ cm}^2$ Also, $\text{ar}(\triangle ABC) = \left(\frac{1}{2} \times r \times 4\right) + \left(\frac{1}{2} \times r \times 3\right) + \left(\frac{1}{2} \times r \times 5\right)$ $\Rightarrow 6r = 6 \Rightarrow r = 1$ Hence the radius of the circle is 1 cm. </p>	<p>I</p> <p>II</p> <p>III</p> <p>IV</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p>
	<p>OR</p>		
<p>28 (B).</p>	<p>In the given figure, if a circle touches the side QR of $\triangle PQR$ at S and extended sides PQ and PR at M and N respectively, then prove that :</p> $PM = \frac{1}{2} (PQ + QR + PR)$ 		
<p>Sol.</p>	 <p> $PM = PN$ $QS = QM$ $RS = RN$ $PM + PN = PQ + QM + PR + RN$ $2 PM = PQ + QS + PR + RS$ $= PQ + QS + RS + PR$ </p> <div style="position: relative; height: 150px;"> <div style="position: absolute; right: 0; top: 50%; transform: translateY(-50%); font-size: 40px;">}</div> </div>	<p>I</p> <p>II</p> <p>III</p>	<p>1½</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>

	$= PQ + QR + PR$ $\therefore PM = \frac{1}{2} (PQ + QR + PR)$	IV	$\frac{1}{2}$
29.	A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 20 cm and the diameter of the cylinder is 7 cm. Find the total volume of the solid. $\left(\text{Use } \pi = \frac{22}{7} \right)$		
Sol.	Radius of cylinder = radius of hemisphere = $\frac{7}{2}$ cm	I	$\frac{1}{2}$
	Total height of solid = 20 cm		
	Height of cylinder = $\left(20 - \frac{7}{2} - \frac{7}{2} \right)$ cm = 13 cm	II	$\frac{1}{2}$
	Total volume of solid = $\left[\frac{22}{7} \times \left(\frac{7}{2} \right)^2 \times 13 + 2 \times \frac{2}{3} \times \frac{22}{7} \times \left(\frac{7}{2} \right)^3 \right]$ $= \frac{22}{7} \times \left(\frac{7}{2} \right)^2 \times \left(13 + \frac{14}{3} \right)$ $= \frac{4081}{6} = 680.1 \text{ cm}^3 \text{ (approx.)}$	III IV	1 1
30.	Two dice of different colours are thrown at the same time. Write down all the possible outcomes. What is the probability that : (i) same number appears on both the dice ? (ii) different number appears on both the dice ?		
Sol.	Possible outcomes are <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;"> $(1,1)(1,2), (1,3), (1,4), (1,5), (1,6)$ $(2,1), (2,2), (2,3), (2,4), (2,5), (2,6)$ $(3,1)(3,2), (3,3), (3,4), (3,5), (3,6)$ $(4,1)(4,2), (4,3), (4,4), (4,5), (4,6)$ $(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)$ $(6,1), (6,2), (6,3), (6,4), (6,5), (6,6)$ </div> <div style="font-size: 4em; margin: 0 10px;">}</div> </div>	I	1

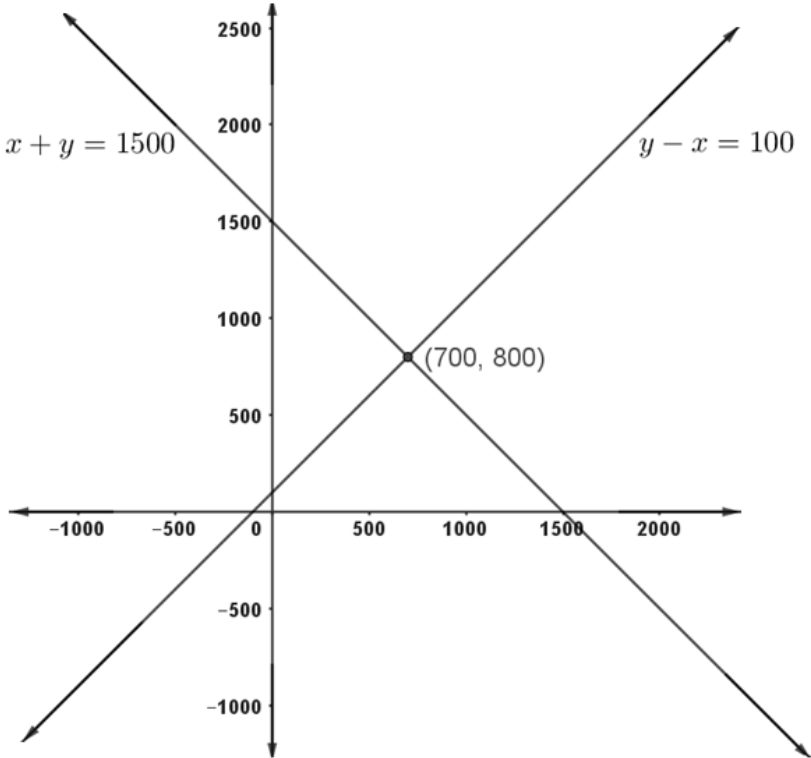
	<p>(i) $P(\text{same number appears on both the dice}) = \frac{6}{36} \text{ or } \frac{1}{6}$</p> <p>(ii) $P(\text{different numbers appear on both the dice}) = 1 - \frac{1}{6} = \frac{5}{6}$</p>	II	1
		III	1
31.	<p>Parthi and Alisha found a treasure that is exactly on the straight line joining their locations. Parthi's location is at point $(-6, -5)$ and Alisha's location is at point $(10, 11)$. The distance from the treasure to Parthi's location is three times that of the distance to Alisha's location. Find the coordinates of the location of the treasure.</p>		
Sol.	<p>Let the points P, A and T represent the location of Parthi, Alisha and Treasure respectively.</p> <p>Let the coordinates of T be (x, y)</p> <div style="text-align: center;"> <p style="margin: 0;"> $\begin{array}{ccccccc} & P & & 3 & & T & & 1 & & A \\ & \bullet & & & & \bullet & & & & \bullet \\ (-6, -5) & & & & & (x, y) & & & & (10, 11) \end{array}$ </p> </div> <p>$PT = 3 AT$</p> <p>$\Rightarrow \frac{PT}{AT} = \frac{3}{1}$</p> <p>Coordinates of T are $\left(\frac{10 \times 3 - 6}{3 + 1}, \frac{11 \times 3 - 5}{3 + 1}\right)$</p> <p style="text-align: center;">$= (6, 7)$</p>	<p>I</p> <p>II</p> <p>III</p> <p>IV</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p>
	<p>SECTION – D</p> <p>Question numbers 32 to 35 are Long Answer (LA) type questions, carrying 5 marks each.</p>		
32 (A).	<p>A faster train takes one hour less than a slower train for a journey of 200 km. If the speed of the slower train is 10 km/hr less than that of the faster train, find the speeds of the two trains.</p>		
Sol.	<p>Let the speed of faster train be x km/h</p> <p>\therefore speed of slower train $= (x - 10)$ km/h</p> <p>According to the question,</p>		

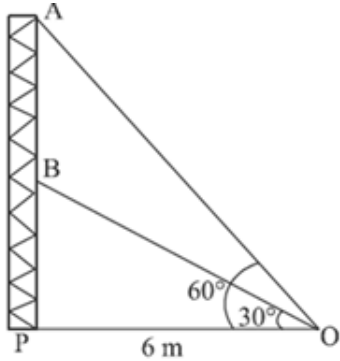
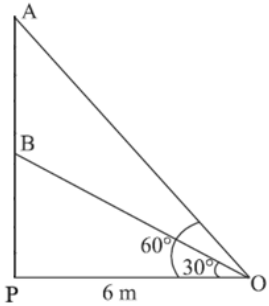
	$\frac{200}{x-10} - \frac{200}{x} = 1$ $\Rightarrow x^2 - 10x - 2000 = 0$ $\Rightarrow (x - 50)(x + 40) = 0$ $\therefore x = 50$ $x = -40 \text{ (Rejected)}$ <p>Hence, speed of faster train = 50 km/h</p> <p>and speed of slower train = 40 km/h</p>	I II III IV V	2 1 1 $\frac{1}{2}$ $\frac{1}{2}$
	OR		
32 (B).	The sum of the areas of two squares is 640 m ² . If the difference in their perimeters is 64 m, find the sides of the two squares.		
Sol.	<p>Let the sides of the two squares be x m and y m ($x > y$)</p> $x^2 + y^2 = 640$ <p>and $4x - 4y = 64 \Rightarrow y = x - 16$</p> $\therefore x^2 + (x - 16)^2 = 640$ $\Rightarrow x^2 - 16x - 192 = 0$ $\Rightarrow (x - 24)(x + 8) = 0$ $\therefore x = 24$ $x = -8 \text{ (Rejected)}$ $\Rightarrow y = 24 - 16 = 8$ <p>Hence the sides of the two squares are 24 m and 8 m</p>	I II III IV V VI	1 1 1 1 $\frac{1}{2}$ $\frac{1}{2}$
33 (A).	State and prove Basic Proportionality Theorem.		

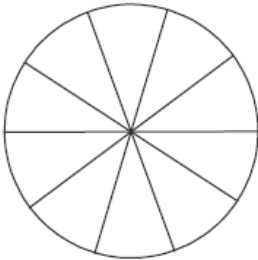
Sol.	<p>For Correct Statement - If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.</p> <p>For Correct given , to prove, construction and figure</p> <p>For correct proof</p>	I	1																		
		II	2																		
		III	2																		
OR																					
33 (B).	<p>In the given figure, CM and RN are respectively the medians of ΔABC and ΔPQR.</p> <p>If $\Delta ABC \sim \Delta PQR$, then prove that :</p> <p>(i) $\Delta AMC \sim \Delta PNR$</p> <p>(ii) $\Delta CMB \sim \Delta RNQ$</p> <div><div></div><div></div></div>																				
Sol.	<p>(i) $\Delta ABC \sim \Delta PQR \Rightarrow \angle A = \angle P$</p> <p>$\frac{AB}{PQ} = \frac{AC}{PR} \Rightarrow \frac{2 AM}{2 PN} = \frac{AC}{PR}$ (as CM and RN are the medians)</p> <p>$\therefore \Delta AMC \sim \Delta PNR$</p> <p>(ii) $\Delta ABC \sim \Delta PQR \Rightarrow \angle B = \angle Q$</p> <p>$\frac{AB}{PQ} = \frac{BC}{QR} \Rightarrow \frac{2 MB}{2 NQ} = \frac{BC}{QR}$ (as CM and RN are the medians)</p> <p>$\therefore \Delta CMB \sim \Delta RNQ$</p>	I	$\frac{1}{2}$																		
		II	$1\frac{1}{2}$																		
		III	$\frac{1}{2}$																		
		IV	$\frac{1}{2}$																		
		V	$1\frac{1}{2}$																		
		VI	$\frac{1}{2}$																		
34.	<p>The monthly expenditure on fruits in 200 families of a Housing Society is given below. Find the value of x and also find the mode and mean expenditure on fruits.</p> <table><tr><th>Monthly Expenditure (in ₹)</th><th>No. of Families</th></tr><tr><td>1000-1500</td><td>24</td></tr><tr><td>1500-2000</td><td>40</td></tr><tr><td>2000-2500</td><td>33</td></tr><tr><td>2500-3000</td><td>28</td></tr><tr><td>3000-3500</td><td>x</td></tr><tr><td>3500-4000</td><td>22</td></tr><tr><td>4000-4500</td><td>16</td></tr><tr><td>4500-5000</td><td>7</td></tr></table>	Monthly Expenditure (in ₹)	No. of Families	1000-1500	24	1500-2000	40	2000-2500	33	2500-3000	28	3000-3500	x	3500-4000	22	4000-4500	16	4500-5000	7		
Monthly Expenditure (in ₹)	No. of Families																				
1000-1500	24																				
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4500-5000	7																				

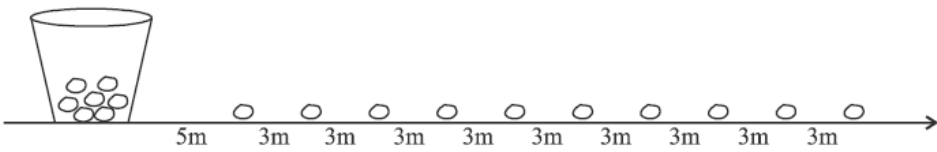
Sol.	Class Interval	Frequency (f_i)	x_i	$f_i x_i$		
	1000 – 1500	24	1250	30000		
	1500 – 2000	40	1750	70000		
	2000 – 2500	33	2250	74250		
	2500 – 3000	28	2750	77000		
	3000 – 3500	x	3250	$3250 x$		
	3500 – 4000	22	3750	82500		
	4000 – 4500	16	4250	68000		
	4500 – 5000	7	4750	33250		
	Total	$170 + x$		$435000 + 3250 x$		
	Correct Table				I	1½
	$170 + x = 200 \Rightarrow x = 30$				II	½
	1500 – 2000 is the modal class				III	½
	$\Rightarrow \text{Mode} = 1500 + \left(\frac{40-24}{2 \times 40 - 24 - 33} \right) \times 500$				IV	1
	$= 1500 + 347.82$					
	$= 1847.82$				V	½
	Hence the modal monthly expenditure is ₹ 1847.82					
	$\therefore \sum f_i x_i = 435000 + 3250 \times 30 = 532500$				VI	½

<div>Mean = $\frac{532500}{200} = 2662.50$</div> <div>Hence the mean monthly expenditure is ₹ 2662.50</div> <div>ALTERNATE SOLUTION:</div> <div>$\sum f_i = 170 + x = 200$</div> <div>$\Rightarrow x = 30$</div> <table><tr><th>Class Interval</th><th>Frequency (f_i)</th><th>x_i</th><th>u_i</th><th>$f_i u_i$</th></tr><tr><td>1000 – 1500</td><td>24</td><td>1250</td><td>–3</td><td>–72</td></tr><tr><td>1500 – 2000</td><td>40</td><td>1750</td><td>–2</td><td>–80</td></tr><tr><td>2000 – 2500</td><td>33</td><td>2250</td><td>–1</td><td>–33</td></tr><tr><td>2500 – 3000</td><td>28</td><td>2750</td><td>0</td><td>0</td></tr><tr><td>3000 – 3500</td><td>30</td><td>3250</td><td>1</td><td>30</td></tr><tr><td>3500 – 4000</td><td>22</td><td>3750</td><td>2</td><td>44</td></tr><tr><td>4000 – 4500</td><td>16</td><td>4250</td><td>3</td><td>48</td></tr><tr><td>4500 – 5000</td><td>7</td><td>4750</td><td>4</td><td>28</td></tr><tr><td>Total</td><td>200</td><td></td><td></td><td>–35</td></tr></table>	Class Interval	Frequency (f_i)	x_i	u_i	$f_i u_i$	1000 – 1500	24	1250	–3	–72	1500 – 2000	40	1750	–2	–80	2000 – 2500	33	2250	–1	–33	2500 – 3000	28	2750	0	0	3000 – 3500	30	3250	1	30	3500 – 4000	22	3750	2	44	4000 – 4500	16	4250	3	48	4500 – 5000	7	4750	4	28	Total	200			–35	VII	$\frac{1}{2}$
	Class Interval	Frequency (f_i)	x_i	u_i	$f_i u_i$																																															
	1000 – 1500	24	1250	–3	–72																																															
	1500 – 2000	40	1750	–2	–80																																															
	2000 – 2500	33	2250	–1	–33																																															
	2500 – 3000	28	2750	0	0																																															
	3000 – 3500	30	3250	1	30																																															
	3500 – 4000	22	3750	2	44																																															
	4000 – 4500	16	4250	3	48																																															
	4500 – 5000	7	4750	4	28																																															
Total	200			–35																																																
	I	$\frac{1}{2}$																																																		

	<p>Hence the modal monthly expenditure is ₹ 1847.82</p> <p>Mean = $2750 + \frac{(-35)}{200} \times 500$</p> <p>= 2662.50</p> <p>Hence the mean monthly expenditure is ₹ 2662.50</p>	<p>VI</p> <p>VII</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>
35.	<p>Two sections, A and B, of class X contributed a total of ₹ 1500 for the Uttarakhand flood victims. The contribution from X-A was ₹ 100 less than that of X-B. Graphically, find the amounts contributed by both sections.</p>		
Sol.	<p>Let x and y be the amounts contributed by the classes X-A and X-B respectively.</p> <p>According to question,</p> <p>$x + y = 1500$ and $x = y - 100$ or $y - x = 100$</p>  <p>Correct Graph of the equation $x + y = 1500$</p> <p>Correct graph of the equation $y - x = 100$</p> <p>\therefore Amount contributed by class X-A = ₹ 700</p> <p>and amount contributed by class X-B = ₹ 800</p>	<p>I</p> <p>II</p> <p>III</p> <p>IV</p> <p>V</p>	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$1\frac{1}{2}$</p> <p>$1\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>

	<p style="text-align: center;">SECTION – E</p> <p style="text-align: center;">Question numbers 36 to 38 are Case Study Based questions, carrying 4 marks each</p>		
36.	<p>Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two sections 'A' and 'B'. Tower is supported by wires from a point 'O' (as shown in figure).</p>  <p>Distance between the base of the tower and point 'O' is 6 m. From point 'O', the angle of elevation of the top of the section 'B' is 30° and the angle of elevation of the top of section 'A' is 60°.</p> <p>Based on the above information, answer the following questions :</p> <p>(i) Find the length of the wire from the point 'O' to the top of section 'B'.</p> <p>(ii) Find the length of the wire from the point 'O' to the top of section 'A'.</p> <p>(iii) (a) Find the distance AB.</p> <p style="text-align: center;">OR</p> <p>(iii) (b) Find the area of $\triangle OPB$.</p>		
Sol.	 <p>(i) $\cos 30^\circ = \frac{\sqrt{3}}{2} = \frac{6}{OB}$</p> <p>$\Rightarrow OB = \frac{12}{\sqrt{3}}$ or $4\sqrt{3}$ m</p> <p>(ii) $\cos 60^\circ = \frac{1}{2} = \frac{6}{OA}$</p> <p>$\Rightarrow OA = 12$ m</p> <p>(iii) (a) $\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{BP}{6}$</p>	<p style="text-align: center;">I</p> <p style="text-align: center;">II</p> <p style="text-align: center;">I</p> <p style="text-align: center;">II</p>	<p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p>

	$\Rightarrow BP = 2\sqrt{3} \text{ m}$ $\tan 60^\circ = \sqrt{3} = \frac{AP}{6}$ $\Rightarrow AP = 6\sqrt{3} \text{ m}$ $AB = AP - BP = 6\sqrt{3} - 2\sqrt{3} = 4\sqrt{3} \text{ m}$ <p style="text-align: center;">OR</p> <p>(iii) (b) $\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{BP}{6}$</p> $\Rightarrow BP = 2\sqrt{3} \text{ m}$ $\text{ar}(\triangle OPB) = \frac{1}{2} \times BP \times OP$ $= \frac{1}{2} \times 2\sqrt{3} \times 6 = 6\sqrt{3} \text{ m}^2$	I	1
		II	$\frac{1}{2}$
		III	$\frac{1}{2}$
		I	1
		II	1
37.	<p>A brooch is crafted from silver wire in the shape of a circle with a diameter of 35 cm. The wire is also used to create 5 diameters, dividing the circle into 10 equal sectors as shown in figure.</p>  <p>Based on the above information, answer the following questions :</p> <p>(i) What is the radius of circle ?</p> <p>(ii) What is the circumference of the brooch ?</p> <p>(iii) (a) What is the total length of silver wire required ?</p> <p style="text-align: center;">OR</p> <p>(iii) (b) What is the area of each sector of the brooch ?</p>		
Sol.	<p>(i) $r = \frac{35}{2} \text{ cm} = 17.5 \text{ cm}$</p> <p>(ii) Circumference $= 2 \times \frac{22}{7} \times \frac{35}{2} = 110 \text{ cm}$</p> <p>(iii) (a) Total length of wire required $= (5 \times 35 + 110) \text{ cm}$ $= 285 \text{ cm}$</p>	I	1
		I	1
		I	1
		II	1

	<p style="text-align: center;">OR</p> <p>(iii) (b) Central angle of each sector = $\frac{360}{10} = 36^\circ$</p> <p>Area of each sector = $\frac{36}{360} \times \frac{22}{7} \times \frac{35}{2} \times \frac{35}{2}$</p> <p style="text-align: center;">$= \frac{385}{4}$ or 96.25 cm^2</p>	I	1
		II	1
38.	<p>In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato. The other potatoes are arranged 3 m apart in a straight line, with a total of 10 potatoes, as shown in the figure :</p>  <p>A competitor starts from the bucket, picks up the nearest potato, runs back to the bucket to drop it in, then returns to pick up the next potato. This process continues until all the potatoes are in the bucket.</p> <p>Based on the above information, answer the following questions :</p> <p>(i) What is the distance covered to pick up the first potato and drop it in bucket ?</p> <p>(ii) What is the distance covered to pick up the second potato and drop it in bucket ?</p> <p>(iii) (a) What is the total distance the competitor has to run ?</p> <p style="text-align: center;">OR</p> <p>(iii) (b) If average speed of competitor is 5 m/s, then find the average time taken by competitor to put all the potatoes in the bucket.</p>		
Sol.	<p>(i) Required distance for the first potato = $5 + 5 = 10 \text{ m}$</p> <p>(ii) Required distance for the second potato = $8 + 8 = 16 \text{ m}$</p> <p>(iii) (a) Distances covered form an A.P. with $a = 10$ and $d = 6$</p> <p style="text-align: center;">$\therefore S_{10} = \frac{10}{2} [2 \times 10 + 9 \times 6]$</p> <p style="text-align: center;">$= 5 \times 74 = 370 \text{ m}$</p> <p style="text-align: center;">OR</p> <p>(iii) (b) Distances covered form an A.P. with $a = 10$ and $d = 6$</p>	I I I II I	1 1 1 1 $\frac{1}{2}$

	$\therefore S_{10} = \frac{10}{2} [2 \times 10 + 9 \times 6]$ $= 5 \times 74 = 370 \text{ m}$ $\text{Time} = \frac{370}{5} = 74 \text{ seconds}$	II III	1 $\frac{1}{2}$
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